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**FIREFIGHTERS' UNIFIED RETIREMENT SYSTEM
STATE OF MONTANA
ACTUARIAL VALUATION
AS OF JULY 1, 1994**

STATE DOCUMENTS

1994-1-1

MONTANA STATE LI
1515 E. 6th Ave
HELENA, MONTANA

Firefighters' Unified Retirement System

State of Montana

Actuarial Valuation

As of July 1, 1994

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Firefighters' Unified Retirement System

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Firefighters' Unified Retirement System

Section I

Introduction

An actuarial valuation of the Firefighters' Retirement System of the State of Montana has been completed as of July 1, 1994. This valuation was authorized by the Public Employees' Retirement Board under Section 19-2-405, MCA. The purpose of the valuation was to determine the financial position of the fund, the normal cost, and the unfunded accrued liability based upon present and prospective assets and liabilities of the system as of July 1, 1994.

Section II presents an analysis of the results of the actuarial valuation. The numerical findings and membership data supporting this analysis are shown in Section III.

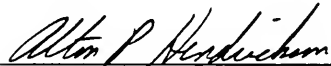
In conducting the actuarial valuation, certain assumptions were made as to the future experience of the system. A summary and discussion of each of the assumptions is contained in Section IV.

The valuation is based upon the Firefighters' Retirement Act and incorporates all amendments as of July 1, 1994. A summary of the major provisions of the Act is contained in Section V.

Actuarial Certification

The results of the actuarial valuation shown in this report are based upon information provided by the Public Employees' Retirement Division regarding plan participants, plan assets and other matters as of June 30, 1994. The values have been calculated on the basis of actuarial assumptions which, in my opinion, are appropriate for purposes of this valuation.

This valuation has been prepared in accordance with generally accepted actuarial principles and practices and, to the best of my knowledge, fairly reflects the actuarial position of the Firefighters' Retirement System as of July 1, 1994.



Alton P. Hendrickson
Member, American Academy of
Actuaries



Firefighters' Unified Retirement System

Section II

Analysis of Valuation

Results of Valuation

An actuarial valuation has been conducted for the Firefighters' Unified Retirement System as of July 1, 1994. This valuation has determined that the percent of each member's compensation required to fund the benefits as they accrue in the future is 19.03%. The regular contribution rate of 42.29% allows 23.26% to be applied to the unfunded past service liability. This percent is sufficient to amortize the unfunded past service liability over a period of 27.74 years. This period has decreased from 30.36 years in 1992.

Asset Valuation

For purposes of the actuarial valuation, the system's assets are valued at market value, with gain and loss fluctuations smoothed over a 4-year period. The table below illustrates this valuation procedure:

	<u>Actual</u>		<u>Adjusted</u>
Cost Value as of 6/30/94	47,740,282		47,740,282
1994 Market Gain	(3,093,770)	x .25	(773,443)
1993 Market Gain	1,526,614	x .50	763,307
1992 Market Gain	2,059,753	x .75	1,544,815
Prior Market Gain	1,569,378	x 1.00	1,569,378
	-----		-----
Market Value as of 06/30/94	49,802,257		50,844,339

Investment Performance

The adjusted value bases produced an investment return of 8.45% during the 1993-94 fiscal year. The rate of investment return was 1.45% on a market value basis and 8.44% on a cost value basis. These rates were based on all assets of the system including accruals, and assumed uniform fund activity throughout the year.

Contribution

The member's contribution was 6% of compensation, each city's was 13.02% of compensation and the state's was 23.27%.



Amortization of Unfunded Liability

The Public Employees' Retirement Board has set a goal of funding liabilities over a period not to exceed 30 years. The schedule in this report illustrates the rate required to fund each valuation's new liabilities over a 30-year period.

The amortization period of past liabilities decreases 2 years with each valuation. The schedule began with an initial liability established on July 1, 1984.

Actuarial Assumptions

An experience study was completed in 1994 to investigate the actuarial experience of the Firefighters' Unified Retirement System of the State of Montana. A review of the system's data and experience revealed that changes needed to be made to the following assumptions: mortality, withdrawal, disability, salary increases and service purchases. The remaining actuarial assumptions did not warrant a change from those used in the valuation of July 1, 1992. The assumption changes are described further in the Discussion of Actuarial Assumptions.

The overall effect of the revised assumptions was an increase in the funding period of 1.18 years from 26.56 to 27.74. Had the additional cost not been absorbed in the funding period, the annual required contribution would have increased .78% of compensation.

Summary of Data

The active membership was 412 on June 30, 1994 compared to 420 on June 30, 1992. The annual payroll increased from \$10.9 to \$12.4 million during the biennium and the average pay per member grew at the rate of 7.88% per year.

The average active member is 40.6 years of age, was employed at age 26.7, has completed 13.9 years of service, and earns \$30,156.

The number of members receiving benefits was 417 on June 30, 1994 compared to 401 on June 30, 1992. The annual benefit payout increased from \$4.75 to \$5.24 million during the biennium.

The average retiree is 64.6 years of age, retired at age 50.0 with 24.7 years of service, and receives a benefit of \$1,048 per month. The average benefit payout per retired member grew at the rate of 2.53% per year.

Conclusion

Because of increased payroll and benefit payouts, the system's total liability grew by 9.96%. This was offset by a 15.1% growth in assets. The current funding level allows the system's unfunded liability to be funded over 27.74 years compared to 30.36 years in 1992.

Based on the results of this valuation, the Firefighters' Retirement System is actuarially sound.



Firefighters' Unified Retirement System

Section III

Schedule 1

Normal Cost Allocation

(1) Normal Cost Contribution Rate:

(a) Retirement	16.05%
(b) Death	0.74
(c) Disability	1.95
(d) Vested	* 0.21
(e) Withdrawals	0.08

(f) Total Rate	19.03%

(2) Present Value of Future Salaries Of Current Members	\$ 95,721,928
(3) Present Value of Future Normal Costs For Current Members (1(f) * (2))	\$ 18,215,883



Firefighters' Unified Retirement System

Schedule 2

Present Value of Benefits

(1) Present Value of Benefits - Inactive Members

(a) Retirement	\$ 36,721,331
(b) Death	2,992,784
(c) Disability	13,860,640
(d) Vested	661,565
(e) Withdrawals	42,899

(f) Total Inactive	\$ 54,279,219

(2) Present Value of Benefits - Active Members

(a) Retirement	\$ 71,418,973
(b) Death	1,472,724
(c) Disability	3,863,025
(d) Vested	420,790
(e) Withdrawals	103,237

(f) Total Active	\$ 77,278,749

(3) Total Liabilities \$ 131,557,968



Firefighters' Unified Retirement System

Schedule 3

Liability Allocation and Statutory Funding

(1) Unfunded Past Service Liability

(a) Present Value of Benefits	\$ 131,557,968
(b) Present Value of Future Normal Costs	\$ 18,215,883
(c) Fund Assets	\$ 50,844,339

(d) Unfunded Liability (a)-(b)-(c)	\$ 62,497,746

(2) Contribution Rates Amortized over 27.74 Years

(a) Present Value of Salaries During Next 27.74 Years	\$ 268,691,920
(b) Unfunded Contribution Rate (1(d)/2(a))	23.26%
(c) Normal Cost Rate (Schedule 1)	19.03

(d) Statutory Funding Rate	42.29%

Firefighters' Unified Retirement System

Schedule 4

Unfunded Liability Amortization Schedule

(1) Biennial Unfunded Past Service Liability Accounts

Year	Liability Account On 7/1/92	Interest Charged To Acc't	Contribn Credited To Acc't	Interest Credited To Contrb	Liability Account On 7/1/94
1984	66,113,140	11,001,226	2,244,482	174,339	74,695,545
1986	-2,655,975	-441,954	-90,168	-7,004	-3,000,757
1988	1,791,712	298,141	60,827	4,725	2,024,301
1990	-4,142,046	-689,236	-140,619	-10,922	-4,679,741
1992	-4,658,284	-775,138	-158,145	-12,284	-5,262,993

(2) Actuarial Gain/Loss

Current Unfunded Liability (Schedule 3)	\$ 62,497,746
Less 1984 Liability Account	74,695,545
Less 1986 Liability Account	-3,000,757
Less 1988 Liability Account	2,024,301
Less 1990 Liability Account	-4,679,741
Less 1992 Liability Account	-5,262,993
1994 Liability Account as of 7/1/94	\$ -1,278,609

(3) Required Contribution Rate

Normal Cost Rate (Schedule 1)	19.03%
Rate to Fund 1984 Liability Over 20 Years	36.06
Rate to Fund 1986 Liability Over 22 Years	-1.34
Rate to Fund 1988 Liability Over 24 Years	0.84
Rate to Fund 1990 Liability Over 26 Years	-1.83
Rate to Fund 1992 Liability Over 28 Years	-1.94
Rate to Fund 1994 Liability Over 30 Years	-0.45
Contribution Rate for 30-Year Schedule	50.37%



Firefighters' Unified Retirement System

Schedule 5

Table 1

Comparison of Valuations

	<u>1992</u>	<u>1994</u>
(1) Unfunded Past Service Liability		
(a) Present Value of Benefits	\$119,640,358	\$131,557,968
(b) Present Value of Future Costs	\$ 19,033,199	\$ 18,215,883
(c) Fund Assets	\$ 44,158,612	\$ 50,844,339
(d) Unfunded Liability	\$ 56,448,547	\$ 62,497,746
(2) Amortization Period and Contribution Rates		
(a) Years for Amortization	30.36	27.74
(b) Unfunded Contribution Rate	20.98%	23.26%
(c) Normal Cost Rate	21.31%	19.03%
(d) Statutory Funding Rate	42.29%	42.29%
(3) Active Members		
(a) Number of Members	420	412
(b) Annual Payroll	\$10,883,033	\$12,424,267
(c) Average Annual Salary	\$ 25,912	\$ 30,156
(4) Inactive Members		
(a) Number of Retired	255	266
(b) Number of Disabled	113	116
(c) Number of Survivors	33	35
(d) Number of Vested Deferred	5	5
(e) Annual Benefits	\$4,754,661	\$5,240,200
(f) Average Monthly Benefit	\$ 998	\$ 1,047



Firefighters' Unified Retirement System

Table 2

Comparison of Active Members

City	1992		1994	
	Active Members	Annual Salary	Active Members	Annual Salary
Anaconda	6	\$ 147,712	6	\$ 157,869
Billings	103	\$ 2,961,774	103	\$ 3,195,005
Bozeman	23	\$ 658,437	23	\$ 682,866
Butte	33	\$ 894,066	33	\$ 984,496
Glendive	21	\$ 143,417	5	\$ 129,668
Great Falls	60	\$ 1,814,662	63	\$ 2,108,925
Havre	18	\$ 389,812	17	\$ 420,710
Helena	33	\$ 904,234	33	\$ 992,098
Kalispell	20	\$ 573,212	21	\$ 671,896
Lewistown	16	\$ 151,115	7	\$ 159,736
Livingston	12	\$ 240,980	15	\$ 371,951
Miles City	13	\$ 337,692	13	\$ 361,611
Missoula	60	\$ 1,627,779	71	\$ 2,146,103
Red Lodge	2	\$ 38,140	2	\$ 41,333
Total	420	\$10,883,032	412	\$12,424,267

Firefighters' Unified Retirement System

Table 3

Comparison of Members Receiving Benefits

City	1992		1994	
	Inactive Members	Annual Benefit	Inactive Members	Annual Benefit
Anaconda	18	\$ 226,228	18	\$ 233,260
Billings	84	\$ 1,116,667	87	\$ 1,227,672
Bozeman	12	\$ 164,453	18	\$ 287,254
Butte	42	\$ 547,141	43	\$ 580,812
Glendive	27	\$ 120,506	31	\$ 132,251
Great Falls	73	\$ 951,553	72	\$ 1,003,665
Havre	9	\$ 94,050	10	\$ 107,399
Helena	29	\$ 385,056	32	\$ 469,304
Kalispell	22	\$ 278,092	23	\$ 308,372
Lewistown	20	\$ 118,394	19	\$ 113,605
Livingston	8	\$ 66,823	8	\$ 71,781
Miles City	19	\$ 209,161	19	\$ 215,109
Missoula	33	\$ 437,861	33	\$ 449,957
Red Lodge	5	\$ 38,676	4	\$ 39,759
Total	401	\$ 4,754,661	417	\$ 5,240,200

Firefighters' Unified Retirement System

Schedule 6

Table 1

Number of Active Members

Years of Service	Member's Age									Total
	20-25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	OVER 60	
0-4	6	29	33	7	1	1	1			78
5-9		4	38	29	8	4		1		84
10-14			8	24	17	2				51
15-19			1	19	33	21	5			79
20-24					13	52	15			80
25-29						6	15	5		26
30-34							3	9	1	13
35-39									1	1
40-UP										
Total	6	33	80	79	72	86	39	15	2	412

Firefighters' Unified Retirement System

Table 2

Average Salaries of Active Members

Years of Service	Member's Age									Total
	20-25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	OVER 60	
0-4	25303	25220	26643	27025	24151	41454	49857			26500
5-9		26338	27621	27213	27887	25953		56520		27709
10-14			28708	29809	28706	28270				29208
15-19			33095	30306	30623	30143	27405			30247
20-24					33901	33546	33989			33687
25-29						34839	37020	34588		36049
30-34							35012	37893	36144	37094
35-39									36144	36144
40-UP										
Total	25303	25356	27395	28729	30368	32421	34796	38033	36144	30156

Firefighters' Unified Retirement System

Table 3

Number of Vested Inactive Members

Years of Service	Member's Age									Total
	20-25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	Over 60	
0-4										
5-9										
10-14					1	2		1		4
15-19										
20-24						1				1
25-29										
30-34										
35-39										
40-UP										
Total					1	3		1		5

Firefighters' Unified Retirement System

Table 4

Number of Retired Members

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4										
5-9	2						1		1	4
10-14			2				1	1		4
15-19			2	1	1	1	1			6
20-24	2		16	31	17	15	17	12	19	129
25-29			10	15	15	20	12	4	9	85
30-34				1	3	6	6	1	7	24
35-39					3	1	1	2	4	11
40-UP						2		1		3
Total	4		30	48	39	45	39	21	40	266

Firefighters' Unified Retirement System

Table 5

Average Benefits of Retired Members

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4										
5-9	122						116		872	308
10-14			299				1099	809		626
15-19			342	105	809	105	105			301
20-24	1009		1168	1051	1109	820	1042	987	826	1005
25-29			1657	1440	1199	934	979	1055	924	1166
30-34				1625	1035	1321	1193	1021	1041	1172
35-39					1705	1391	1421	1162	1088	1327
40-UP						134		1360		542
Total	566		1218	1165	1176	903	1009	1028	913	1048

Firefighters' Unified Retirement System

Table 6

Number of Disabled Members

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4	3	1								4
5-9	3		1	1	1	1	1		2	10
10-14	5	3	5	1	1		3	1	3	22
15-19	1	7	3	7	6	2	1	1	3	31
20-24		1		1	4	8	5	9	7	35
25-29				1	3	2	1	1	2	10
30-34				1					1	2
35-39									2	2
40-UP										
Total	12	12	9	12	15	13	11	12	20	116

Firefighters' Unified Retirement System

Table 7

Average Benefits of Disabled Members

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4	1019	1083								1035
5-9	955		1052	1047	828	1135	1135		1068	1020
10-14	1003	962	942	1083	1135		1058	1047	1060	1011
15-19	1342	1178	1094	1070	1043	1002	1088	953	1009	1087
20-24		1385		1226	1082	1041	1109	1074	1079	1087
25-29				1571	1034	919	809	1052	1115	1060
30-34				1394					1083	1239
35-39									1067	1067
40-UP										
Total	1023	1133	1005	1151	1043	1024	1068	1060	1067	1065

Firefighters' Unified Retirement System

Table 8

Number of Survivors

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4		2								2
5-9		1	1					1	1	4
10-14		2		1	1		1	1	2	8
15-19		4	1		1		1	1	1	9
20-24						1	1		4	6
25-29						1	1		1	3
30-34			1					1	1	3
35-39										
40-UP										
Total		9	3	1	2	2	4	4	10	35

Firefighters' Unified Retirement System

Table 9

Average Benefits of Survivors

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4		568								568
5-9		1047	1135					1135	828	1037
10-14		1069		967	1047		1135	1135	1094	1076
15-19		575	95		1047		1135	1047	1135	751
20-24						852	1047		1135	1073
25-29						1047	1135		1135	1106
30-34			1905					1052	1135	1364
35-39										
40-UP										
Total		736	1045	967	1047	950	1113	1092	1096	986

Firefighters' Unified Retirement System

Section IV

Actuarial Funding Method

The cost of the retirement system will be determined by its future experience. In calculating the financial requirements of the fund, certain assumptions were made as to the expected future experience. This section summarizes the funding method applied as well as the actuarial assumptions used.

Any variations in the actual experience of the fund from those assumed in this valuation may cause changes in the projected futures costs of the fund. It is therefore necessary that the actuarial assumptions be reviewed from time to time with adjustments as experience warrants. It is also important that regular valuations be performed to determine the financial effect of variations between the actual and assumed experience.

The assumptions used in the valuation are based upon the past experience of the fund together with projections as to future experience.

The method of funding employed is commonly referred to as the entry age normal cost method. This method establishes a normal cost as well as an unfunded accrued liability. The normal cost is the level percentage of total salaries required to fund the benefits, assuming this percentage has been contributed since each member's entry into the fund.

The unfunded accrued liability represents the excess of the present value of total liabilities over the present value of the fund assets and the present value of expected future contributions at the normal cost rate.

In order to maintain the fund on an actuarially sound basis, the rate of contribution should be such as to provide for the normal cost in addition to making progress towards the amortization of the unfunded liability.

Firefighters' Unified Retirement System

Discussion of Actuarial Assumptions

Mortality Rates

The mortality rates for males and females are based upon the 1983 Group Annuity Mortality Table, set back 1 year for active members and 2 years for those perceiving benefits. The July 1, 1992 actuarial valuation used the 1983 GAM Table with no setbacks.

Disability Rates

The disability rates for males and females are based upon the 1983 Disability Table, adjusted to reflect the higher rates experienced by the members.

Withdrawal Rates

The withdrawal rates are based upon the actual experience of the system as determined in the 1994 withdrawal study.

Salary Scale

The rates of salary increase are based upon an assumed compounded growth rate of 6.0% per annum. The July 1, 1992 actuarial valuation used a 6.5% salary scale.

Investment Earnings

It was assumed that the investment earnings would be 8% compounded annually.

Asset Valuation

The assets are based on market value, with gains and losses graduated over a 4-year period.

Administrative Expenses

It was assumed that the system would incur no administrative expenses beyond those provided by investment earnings in excess of 8%.

Termination Benefits

It was assumed that all members terminating with less than ten years of service would receive an immediate withdrawal of their member contributions with interest. It was further assumed that members with ten or more years of service would select the most advantageous benefits under the given assumptions.

Service Purchases

It was assumed that $\frac{1}{3}$ of the members that are within 15 years of service until reaching the assumed retirement age will purchase or buy back 3 years of service. The cost of this service was assumed to equal 20% of the total liability.

Firefighters' Unified Retirement System

Illustration of Actuarial Assumptions

Mortality Rates

Active Members:

The mortality rates are based upon the 1983 Group Annuity Mortality Table setback 1.

Age	Deaths Per 10,000 Male Members	Deaths Per 10,000 Female Members
25	4	2
30	6	3
35	8	4
40	11	6
45	19	9
50	35	15
55	57	23
60	84	38
65	139	64
70	248	109
75	404	211
80	607	385
85	1,060	638

Members Receiving Benefits:

The mortality rates are based upon the 1983 Group Annuity Mortality Table setback 2.

Age	Deaths Per 10,000 Male Members	Deaths Per 10,000 Female Members
25	4	2
30	5	3
35	7	4
40	10	6
45	17	8
50	31	14
55	52	21
60	77	34
65	124	58
70	222	97
75	367	115
80	607	345
85	975	581

Disability Rates

The disability rates are based upon the 1983 Disability Table.

Age	Disabilities Per 10,000 Male Members	Disabilities Per 10,000 Female Members
25	4	4
30	8	12
35	12	20
40	24	36
45	48	60
50	80	88
55	204	164
60	420	348

Withdrawal Rates

The withdrawal rates illustrated below reflect the turnover experienced by the Firefighters' Retirement System.

Age	Withdrawals Per 10,000 Active Members
25	812
30	468
35	239
40	54
45	30
50	0

Salary Scale

The salary increases are based upon an assumed compounded growth rate of 6.0% per annum.

Investment Earnings

Future investment earnings are assumed to be 8% compounded annually.

Asset Valuation

The assets are based on market value, with gains and losses graduated over a 4-year period.

Administrative Expenses

It was assumed that the administrative expenses would be recovered by investment earnings in excess of 8%.

Service Purchases

It was assumed that 1/3 of the members within 15 years of retirement will be purchasing 3 years of service.

Firefighters' Unified Retirement System

Section V

Summary of Benefits and Contributions

Employee Contributions -	6% of member's compensation.
City Contributions -	13.02% of member's compensation.
State Contribution -	23.27% of members' compensation.
Retirement Benefit -	<p>Eligibility: Age 50 and 10 years of service.</p> <p>Normal Form: Life payments, with full benefits continuing to the surviving spouse or dependent children upon the member's death.</p> <p>Benefit if hired before July 1, 1981: $2.5\% \times \text{final monthly compensation (FMC)} \times \text{years of service up to 20} + 1\% \times \text{years of service over 20} \times \text{FMC}$. Maximum benefit is 60% of FMC.</p> <p>Benefit if hired on or after June 30, 1981: $2\% \times \text{years of service (30 years maximum)} \times \text{final average salary (FAS)}$. Maximum benefit is 60% of FAS.</p>
Disability Benefit -	Minimum of 50% of FMC + 1% for each year of service over 20 years. Maximum benefit is 60% if FMC.
Death Benefit -	Minimum of 50% of FMC + 1% for each year of service over 20 years. Maximum benefit is 60% of FMC.
Termination Benefit -	Prior to 10 years of service, return of member contributions. After 10 years, the member may elect to receive a benefit of 2% of final compensation for each year of service, commencing at age 50.

Benefit Adjustments -

If the benefits are less than one-half of the monthly salary paid to a newly confirmed firefighter in the city in which the member was employed, the monthly payments are to be increased to one-half of such monthly salary.

The cost of this adjustment for members retired prior to July 1, 1973 is paid from the fire insurance premium tax fund. The service retirement benefit for members hired on or after July 1, 1981 is also paid from this premium tax, provided funds are available.

